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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/683,743 | 02/08/2002 | Kevin Paul Deveney | 13DV-13628 | 3375 |

23465 7590 10/05/2004

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| **ART UNIT** | **PAPER NUMBER** |
| 2856 | |

DATE MAILED: 10/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

| Office Action Summary | Application No. | Applicant(s) |
|---|---|---|
| | 09/683,743 | DEVENEY ET AL. |
| | Examiner | Art Unit |
| | Rose M Miller | 2856 |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *24 August 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-4,7-13 and 16-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7-13 and 16-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 February 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-4, 7-13, and 16-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: utilization of the correlation of the plurality of amplitudes with the at least one non-ultrasound test of each of the second aircraft engine parts. Why is there a correlation step here? The first problem is that the claim does nothing with the correlation step, it just hangs on the end of the method. The second problem arises from the order of the steps. Why would you correlate the plurality of amplitudes <u>after</u> predicting the residual strength when the specification clearly indicates that the correlation is how the residual strength is predicted? This is strengthed by claims 2-4 and 7-9 which more clearly define the prediction of the residual strength.

Claims 2-4 are rejected as it is unclear if the "correlating" performed in Claim 2 is separate and in addition to the "correlating" performed in Claim 1 from which it depends. Claim 2 is either not further limiting as Claim 1 defines a correlation between a plurality of amplitudes (which clearly includes at least one amplitude) with at least one plurality of results from non-ultrasound tests of the second engine part or is new matter as it adds a second "correlation" step which is not supported by the specification as originally filed. As it is unclear which of the above is the correct interpretation of the claim, Claim 2 is being rejected under this section for being confusing and indefinite. Claims 3-4 are rejected as they fail to correct the problems presented in Claim 2 from which they depend.

Claim 7 is rejected as it fails to correct the problem of Claim 1 from which it depends.

Claims 8-9 are rejected, as it is unclear if the "correlating" performed in Claim 8 is separate and in addition to the "correlating" performed in Claim 1 from which it ultimately depends. Claims 8 and 9 are either not further limiting as Claim 1 defines a correlation between a plurality of amplitudes with at least one plurality of results from non-ultrasound tests of the second engine part and generates a linear least squares fit between the amplitudes and at least one of the plurality of results from the non-ultrasound strength tests, or are new matter as they add a second "correlation" step which is not supported by the specification as originally filed. As it is unclear which of the above is the correct interpretation of the claim, Claims 8-9 are being rejected under this section for being confusing and indefinite.

Claims 10-13 and 16--18 are rejected as being confusing and indefinite. Claim 10 contains the phrase "said memory further contains a linear least squares fit between the amplitudes and a plurality of results from the non-ultrasound tests". As with method Claim 1, there is no connection between the least squares fit and the rest of the elements recited in the claim. So why have a linear least squares fit if it is not utilized?

Claims 11-13 are rejected as it is unclear if the "correlation" found in the memory of each of the claims is separate and in addition to the "correlation" found in the memory of Claim 10 from which it depends. Claims 11-13 are either not further limiting as Claim 10 defines a correlation between a plurality of amplitudes (which clearly includes at least one amplitude) with at least one plurality of results from non-ultrasound tests of the second engine part or are new matter as they add a second "correlation" found in the memory that is not supported by the specification as originally filed. As it is unclear which of the above is the correct interpretation of the claims, Claims 11-13 are being rejected under this section for being confusing and indefinite.

Claim 16 is rejected as it fails to correct the problems of Claim 10 from which it depends.

Claims 17-18 are rejected as it is unclear if the "correlating" performed in Claim 18 is separate and in addition to the "correlation" found in the memory of Claim 10 from

which it ultimately depends. Claims 17 and 18 are either not further limiting as Claim 10 defines a correlation between a plurality of amplitudes with at least one plurality of results from non-ultrasound tests of the second engine part and generates a linear least squares fit between the amplitudes and at least one of the plurality of results from the non-ultrasound strength tests, or are new matter as they add a second "correlation" in the memory which is not supported by the specification as originally filed. As it is unclear which of the above is the correct interpretation of the claim, Claims 17-18 are being rejected under this section for being confusing and indefinite.

A good amount of the rejections above result from Applicant attempt to define the correlation being performed in the method and stored in the memory of the apparatus. A suggestion for correction is instead of rewriting the whole correlating step, further limiting the specific individual elements of the correlation. Some suggestions are utilizing phrases similar to --said predicted residual strength being a residual shear strength--, --said non-ultrasound test comprising at least one destructive test of the second aircraft engine part--, and --said at least one destructive test of the second aircraft engine part comprises at least one core sample test of the second aircraft engine part--. The use of these phrases or similar phrases would allow for the narrowing of the claimed invention as desired by Applicant without producing confusion as to how many "correlations" are being performed in the claimed invention.

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-4, 7-13, and 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Hayford et al. ("The correlation of ultrasonic attenuation and shear strength in graphite-polymide composites")** in view of **Ansberg (SU 1322138 A)**.

**Hayford et al.** discloses providing a composite first part (see page 431, 1st paragraph); introducing ultrasound to the first part (page 431, 1st paragraph), receiving reflections of the ultrasound introduced to the first part (page 431, 1st paragraph) and predicting a residual strength (page 431, 1st paragraph in combination with Figure 6 showing the relationship between the attenuation and the failure load) using an attenuation of the received reflections. **Hayford et al.** also discloses correlating the attenuation of at least one received reflection of at least one second part with at least one non-ultrasound test of the second part and specifically wherein the non-ultrasound test is a destructive test of the second part (see pages 438-443). **Hayford et al.** also discloses correlating the attenuation of at least one received reflection of a plurality of second parts with at least one non-ultrasound test of each of the second parts and specifically wherein the non-ultrasound test is a destructive test of the second part (see pages 438-443).

With regards to claims 1-3, 10, and 19, **Hayford et al.** discloses the claimed invention with the exception of using an amplitude of the received reflections to predict the residual strength of the composite part, the composite part comprising an aircraft engine part and the correlation of the amplitude comprises generating a linear least

squares fit between the amplitudes and a plurality of results from the non-ultrasound tests and the composite part comprising an aircraft engine part. **Ansberg** teaches that it is known to correlate the amplitude of the received reflections to the strength of the article under test. **Hayford et al.** teaches with Figure 6 that a measurement of attenuation can be correlated to the failure load of the part under test. It is known throughout the art of ultrasonic testing that an indication of Failure Load is an indication of either the residual strength of a part or the life expectancy of the part under test. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of **Hayford et al.** to correlate the amplitude of the received reflection to the predicted residual strength of the material under test as it is well known throughout the art that in order to measure an attenuation, one must first measure the amplitude of the reflected wave and **Ansberg** clearly teaches that using just the amplitude would reduce the amount of computations necessary to determine the strength of the material under test. As for testing an aircraft engine part, it would have been obvious to one of ordinary skill in the art at the time the invention was made to test aircraft parts on the system disclosed by **Hayford et al.** as **Hayford et al.** teaches testing a composite and the research **Hayford et al.** is based upon was made under a grant from NASA. The majority of aircraft parts (or space craft parts) are made from composite parts. Therefore, the invention of **Hayford et al.** would work equally well on aircraft engine parts as on the disclosed generic composite components. As for the specific use of a linear least squares fit between the amplitudes and the plurality of results from the non-ultrasound tests, **Hayford et al.** discloses on page 439, 3$^{rd}$ paragraph, using a "reasonable straight line fit" to the data and on page 442 using "a linear regression analysis of the data". This is also shown in the graph presented in Figure 6, which correlates the measured attenuation with the Failure Load of the tested part. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made utilize a least squares fit between the measured attenuations (or amplitudes) and a plurality of results from the non-ultrasound (or destructive) tests as the least squares fit is a well known "linear regression analysis" used throughout the

art and **Ansberg** clearly teaches that using the amplitude would reduce the amount of computations necessary to determine the strength of the material under test..

With regards to claim 4, **Hayford et al.** discloses the claimed invention with the exception of the destructive test of the second part comprising a core sample test and the composite part comprising an aircraft engine part. **Hayford et al.** discloses using a "standard short beam shear test" as the destructive test that is correlated with the ultrasound attenuation measured. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to correlate the amplitude of the reflections with the results of a core sample test as the performance of a core sample test is a standard destructive test used to determine a problem with sample or part and **Hayford et al.** teaches correlating a known standard destructive test with a non-destructive ultrasound test. As for testing an aircraft engine part, it would have been obvious to one of ordinary skill in the art at the time the invention was made to test aircraft parts on the system disclosed by **Hayford et al.** as **Hayford et al.** teaches testing a composite and the research **Hayford et al.** is based upon was made under a grant from NASA. The majority of aircraft parts (or space craft parts) are made from composite parts. Therefore, the invention of **Hayford et al.** would work equally well on aircraft engine parts as on the disclosed generic composite components.

With regards to claims 7-9, **Hayford et al.** fails to specifically disclose the residual strength predicted being a residual shear strength and the composite part comprising an aircraft engine part. **Hayford et al.** discloses on page 439, 1st paragraph, using the "nondestructive pulse-echo method" to yield "a quantitative estimate of the short beam shear strength". Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the "residual strength" being measured or predicted would be a residual shear strength as the shear strength is the strength being measured. As for testing an aircraft engine part, it would have been obvious to one of ordinary skill in the art at the time the invention was made to test aircraft parts on the system disclosed by **Hayford et al.** as **Hayford et al.** teaches testing a composite and the research **Hayford et al.** is based upon was made under a grant from NASA. The majority of aircraft parts (or space craft parts) are made from

composite parts. Therefore, the invention of **Hayford et al.** would work equally well on aircraft engine parts as on the disclosed generic composite components. For discussion on the linear least squares fit, see the rejection of Claim 1 above.

With regards to claims 11-12 and 14, **Hayford et al.** discloses the claimed invention with the exception of a memory containing a correlation of an amplitude (or a plurality of amplitudes) of at least one received reflection of at least one second part (or a plurality of parts) with at least one non-ultrasound test, or destructive test, of the (or each) second part, said processor further configured to predict a residual strength of the first part using an amplitude of a received ultrasound reflection and the correlation and the composite part comprising an aircraft engine part. **Hayford et al.** discloses correlating the attenuation of at least one received reflection of at least one second part with at least one non-ultrasound test of the second part and specifically wherein the non-ultrasound test is a destructive test of the second part (see pages 438-443). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of **Hayford et al.** to include the above measured correlation in a memory such that a residual strength of a first part could be predicted using the received reflections and the correlation as **Ansberg** clearly teaches storing a correlation in a memory for the sole purpose of determining the strength of a material by correlating an amplitude of a received reflection with a stored correlation dependency. As for testing an aircraft engine part, it would have been obvious to one of ordinary skill in the art at the time the invention was made to test aircraft parts on the system disclosed by **Hayford et al.** as **Hayford et al.** teaches testing a composite and the research **Hayford et al.** is based upon was made under a grant from NASA. The majority of aircraft parts (or space craft parts) are made from composite parts. Therefore, the invention of **Hayford et al.** would work equally well on aircraft engine parts as on the disclosed generic composite components.

With regards to claim 13, **Hayford et al.** discloses the claimed invention with the exception of memory containing a correlation of an amplitude of at least one received reflection of at least one second part with a core sample test and the composite part comprising an aircraft engine part. **Hayford et al.** discloses using a "standard short

beam shear test" as the destructive test which is correlated with the ultrasound attenuation measured. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to correlate the amplitude of the reflections with the results of a core sample test by utilizing a correlation base on such stored in a memory as the performance of a core sample test is a standard destructive test used to determine a problem with sample or part and **Hayford et al.** teaches correlating a known standard destructive test with a non-destructive ultrasound test and **Ansberg** clearly teaches storing a correlation in a memory for the sole purpose of determining the strength of a material by correlating an amplitude of a received reflection with a stored correlation dependency. As for testing an aircraft engine part, it would have been obvious to one of ordinary skill in the art at the time the invention was made to test aircraft parts on the system disclosed by **Hayford et al.** as **Hayford et al.** teaches testing a composite and the research **Hayford et al.** is based upon was made under a grant from NASA. The majority of aircraft parts (or space craft parts) are made from composite parts. Therefore, the invention of **Hayford et al.** would work equally well on aircraft engine parts as on the disclosed generic composite components.

With regards to claims 16-17, **Hayford et al.** fails to specifically disclose the residual strength predicted being a residual shear strength and the composite part comprising an aircraft engine part. **Hayford et al.** discloses on page 439, 1st paragraph, using the "nondestructive pulse-echo method" to yield "a quantitative estimate of the short beam shear strength". Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the "residual strength" being measured or predicted would be a residual shear strength as the shear strength is the strength being measured. As for testing an aircraft engine part, it would have been obvious to one of ordinary skill in the art at the time the invention was made to test aircraft parts on the system disclosed by **Hayford et al.** as **Hayford et al.** teaches testing a composite and the research **Hayford et al.** is based upon was made under a grant from NASA. The majority of aircraft parts (or space craft parts) are made from composite parts. Therefore, the invention of **Hayford et al.** would work equally well on aircraft engine parts as on the disclosed generic composite components.

With regards to claim 18, see the rejection of claim 10 above for the rejection regarding a linear least square fit.

### *Response to Arguments*

6. Applicant's arguments filed 24 August 2004 have been fully considered but they are not persuasive.

With regards to the rejection of claims 1-19 under 35 U.S.C. § 10 3(a) as being unpatentable over Hayford in view of Ansberg, Applicant argues the following:

> *"Hayford describes a nondestructive pulse-echo method that yields a quantitative estimate for developing an "accept or reject" criterion in a quality assurance program. Page 439, first paragraph. Hayford also describes that those specimens with higher values of attenuation generally fail at the lower values of failure loads. Page 441. Hayford suggests that it "might also be possible to develop the technique for monitoring the growth of damage in composites subjected to various load-time histories to a point that would allow prediction of the residual strength of the composite." Page 431, "Conclusions and Significance", first paragraph.*
>
> *Ansberg describes that a test section of a rail is scanned and a <u>coefficient of variation</u> of the amplitude of the detected vibrations is determined on the control section using an electronic calculator. Ansberg also describes that the strength limit of a corroded test rail is then calculated using the obtained <u>coefficient of variation of the amplitude</u> of the detected vibrations and a correlation dependency.*
>
> *Claim 1 recites a method of ultrasound inspection including "providing a composite first aircraft engine part; introducing ultrasound to the first aircraft engine part; receiving at least one reflection of the ultrasound introduced to the first aircraft engine part; and predicting a residual strength of the first aircraft engine part using an amplitude of the received reflection; correlating a plurality of amplitudes of received reflections of a plurality of second aircraft engine parts with at least one non-ultrasound test of each of the second aircraft engine parts; wherein said correlating a plurality of amplitudes comprises generating a linear least squares fit between the amplitudes and a plurality of results from the non-ultrasound tests".*
>
> *Neither Hayford nor Ansberg describe or suggest the method recited in Claim 1. Specifically, neither Hayford nor Ansberg describe or suggest a method including generating a linear least squares fit between the amplitudes and a plurality of results from the non-ultrasound tests. Rather as stated in the office action dated July 9, 2003 Hayford does not describe "using an amplitude of the received reflections to predict residual strength of the composite" (page 5), and Ansberg describes "using each of the average failure loads for specimens from region two and three and the average failure load and attenuation for the 14 specimens from regions four through ten, a reasonable straight line fit to the data was obtained. Moreover, Ansberg describes that the "spread in both attenuation data and failure loads is more sensitive to experimental and random errors that to material defects. Any attempt to fit a straight line to such data will give poor correlation. Applicants respectively submit that Ansberg does not describe using a least squares fit, rather Ansberg describes using an average of the values to produce a straight line, moreover, the straight ling produced by Ansberg is a poor correlation of the data. Accordingly, Ansberg does not describe a linear least squares fit between the amplitudes and a plurality of results from the non-ultrasound tests. For the reasons set forth above, Claim 1 is submitted to be patentable over Hayford in view of Ansberg."*

**Hayford et al.** teaches that a measured attenuation can be correlated to a Failure Load (see Figures 6 and 8) and it is the measured Failure Load that is used in determining the "accept or reject" of a composite part under test. It is well known throughout the art of composite testing that Failure Load is a straightforward indication of the residual strength of a composite and it is often taken as the measurement of "residual" strength of the part under test (see Figures 6 and 8). Therefore, **Hayford et al.** does teach measuring "residual strength" of the composite part under test.

The **Ansberg** reference is merely relied upon to teach the correlation of the actual measured amplitude to the "strength" of the part under test. It is not relied upon to teach the use of a linear least squares fit between the amplitude and the non-ultrasonic test results. Therefore, **Ansberg** is used only to modify **Hayford et al.** by teaching the necessary correlation between amplitude and strength. **Ansberg** does not have to specifically correlate the amplitude to the strength or to utilize a linear least squares fit to perform the correlation, just to show that the correlation is possible.

As for utilizing a linear least squares fit between the amplitudes and the non-ultrasonic test results, **Hayford et al.** discloses on page 439, 3rd paragraph, using a "reasonable straight line fit" to the data and on page 442 using "a linear regression analysis of the data". This is also shown in the graph presented in Figure 6 that correlates the measured attenuation with the Failure Load of the tested part. One of ordinary skill in the art would have known to utilize a linear least squares fit as a means of determining the correlation between the two sets of data as the linear least squares fit is a well known correlation between two differing sets of data which can be quickly performed on most computers.

Applicant continues to argue:

> *"Claim 10 recites a ultrasound inspection system including "a pulse echo transducer; and a processor operationally coupled to said transducer, said processor configured to predict a residual strength of a first aircraft engine part using an amplitude of a received ultrasound reflection; and a memory containing a correlation of a plurality of amplitudes of received reflections of a plurality of second aircraft engine parts with at least one non-ultrasound test of each of the second aircraft engine parts, said processor further configured to predict a residual strength of the first aircraft engine part using an amplitude of a received ultrasound reflection and the correlation, said memory further contains a linear least squares fit between the amplitudes and a plurality of results from the non-ultrasound tests".*

> *Neither Hayford nor Ansberg describe or suggest a ultrasound inspection system recited in Claim 10. Specifically, neither Hayford nor Ansberg describe or suggest a memory containing a linear least squares fit between the amplitudes and a plurality of results from the non-ultrasound tests. Rather, as stated in the office action dated July 9, 2003 Hayford does not describe "using an amplitude of the received reflections to predict residual strength of the composite" (page 5), and Ansberg describes "using each of the average failure loads for specimens from region two and three and the average failure load and attenuation for the 14 specimens from regions four through ten, a reasonable straight line fit to the data was obtained. Moreover, Ansberg describes that the "spread in both attenuation data and failure loads is more sensitive to experimental and random errors that to material defects. Any attempt to fit a straight line to such data will give poor correlation. Applicants respectively submit that Ansberg does not describe using a least squares fit, rather Ansberg describes using an average of the values to produce a straight line, moreover, a straight ling produced by Ansberg is a poor correlation of the data. Accordingly, Ansberg does not describe a linear least squares fit between the amplitudes and a plurality of results from the non-ultrasound tests. For the reasons set forth above, Claim 10 is submitted to be patentable over Hayford in view of Ansberg."*

**Hayford et al.** teaches that a measured attenuation can be correlated to a Failure Load (see Figures 6 and 8) and it is the measured Failure Load that is used in determining the "accept or reject" of a composite part under test. It is well known throughout the art of composite testing that Failure Load is a straightforward indication of the residual strength of a composite and it is often taken as the measurement of "residual" strength of the part under test (see Figures 6 and 8). Therefore, **Hayford et al.** does teach measuring "residual strength" of the composite part under test.

The **Ansberg** reference is merely relied upon to teach the correlation of the actual measured amplitude to the "strength" of the part under test. It is not relied upon to teach the use of a linear least squares fit between the amplitude and the non-ultrasonic test results. Therefore, **Ansberg** is used only to modify **Hayford et al.** by teaching the necessary correlation between amplitude and strength. **Ansberg** does not have to specifically correlate the amplitude to the strength or to utilize a linear least squares fit to perform the correlation, just to show that the correlation is possible.

As for utilizing a linear least squares fit between the amplitudes and the non-ultrasonic test results, **Hayford et al.** discloses on page 439, 3rd paragraph, using a "reasonable straight line fit" to the data and on page 442 using "a linear regression analysis of the data". This is also shown in the graph presented in Figure 6, which correlates the measured attenuation with the Failure Load of the tested part. One of

ordinary skill in the art would have known to utilize a linear least squares fit as a means of determining the correlation between the two sets of data as the linear least squares fit is a well known correlation between two differing sets of data which can be quickly performed on most computers.

With regards to the rejection of Claim 19, Applicant argues the following:

*"Claim 19 recites an ultrasound inspection device that includes "means for non-destructively testing a first aircraft engine part; means for predicting a residual strength of the first aircraft engine part using a result from a non-destructive test of the first aircraft part engine part with a plurality of destructive and non-destructive tests on second aircraft engine parts substantially similar to the first part and correlating a plurality of amplitudes of received reflections of a plurality of second aircraft engine parts with at least one non-ultrasound test of each of the second aircraft engine parts by generating a linear lest squares fit between the amplitudes and a plurality of results from the non-ultrasound tests".*

*Neither Hayford nor Ansberg describe or suggest a ultrasound inspection device recited in Claim 19. Specifically, neither Hayford nor Ansberg describe or suggest a means for generating a linear least squares fit between the amplitudes and a plurality of results from the non-ultrasound tests. Rather, as stated in the office action dated July 9, 2003 Hayford does not describe "using an amplitude of the received reflections to predict residual strength of the composite" (page 5), and Ansberg describes "using each of the average failure loads for specimens from region two and three and the average failure load and attenuation for the 14 specimens from regions four through ten, a reasonable straight line fit to the data was obtained. Moreover, Ansberg describes that the "spread in both attenuation data and failure loads is more sensitive to experimental and random errors that to material defects. Any attempt to fit a straight line to such data will give poor correlation. Applicants respectively submit that Ansberg does not describe using a least squares fit, rather Ansberg describes using an average of two sets of data to produce a straight line, moreover, the straight ling produced by Ansberg is a poor correlation of the data. Accordingly, Ansberg does not describe a linear least squares fit between the amplitudes and a plurality of results from the non-ultrasound tests. For the reasons set forth above, Claim 19 is submitted to be patentable over Hayford in view of Ansberg."*

**Hayford et al.** teaches that a measured attenuation can be correlated to a Failure Load (see Figures 6 and 8) and it is the measured Failure Load that is used in determining the "accept or reject" of a composite part under test. It is well known throughout the art of composite testing that Failure Load is a straightforward indication of the residual strength of a composite and it is often taken as the measurement of "residual" strength of the part under test (see Figures 6 and 8). Therefore, **Hayford et al.** does teach measuring "residual strength" of the composite part under test.

The **Ansberg** reference is merely relied upon to teach the correlation of the actual measured amplitude to the "strength" of the part under test. It is not relied upon to teach the use of a linear least squares fit between the amplitude and the non-ultrasonic test results. Therefore, **Ansberg** is used only to modify **Hayford et al.** by teaching the necessary correlation between amplitude and strength. **Ansberg** does not have to specifically correlate the amplitude to the strength or to utilize a linear least squares fit to perform the correlation, just to show that the correlation is possible.

As for utilizing a linear least squares fit between the amplitudes and the non-ultrasonic test results, **Hayford et al.** discloses on page 439, 3rd paragraph, using a "reasonable straight line fit" to the data and on page 442 using "a linear regression analysis of the data". This is also shown in the graph presented in Figure 6, which correlates the measured attenuation with the Failure Load of the tested part. One of ordinary skill in the art would have known to utilize a linear least squares fit as a means of determining the correlation between the two sets of data as the linear least squares fit is a well known correlation between two differing sets of data which can be quickly performed on most computers.

***Conclusion***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rose M Miller whose telephone number is 571-272-2199. The examiner can normally be reached on Monday - Thursday, 7:00 am to 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on 571-272-2208. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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RMM
22 March 2004

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